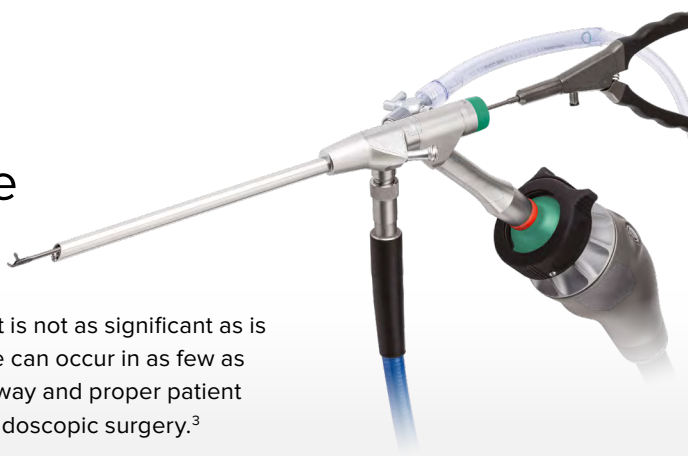
Endoscopic Spine Learning Curve

Scientific Update



There is a learning curve for endoscopic spine procedures. However, it is not as significant as is often discussed. Studies have shown that mastering the learning curve can occur in as few as 15 cases.[1,2] It can be decreased further through a clear education pathway and proper patient selection, as not every patient or procedure is a good candidate for endoscopic surgery.[3]

The benefit zone of full-endoscopic spine surgery.

Saqib Hasan, Roger Härtl, Christoph P Hofstetter

- Full-endoscopic spine surgery employs surgical principles that aim to decrease muscle crush injuries during prolonged retraction, avoid significant soft-tissue stripping, and minimize bony resection. These principles also help prevent iatrogenic instability and lead to decreased postoperative pain and disability.
- To determine whether a particular patient will benefit from endoscopic spine surgery, it is best to estimate the reduction of invasiveness compared to a traditional open surgery but ensuring the same surgical goals can be achieved
- Endoscopic discectomy can offer a faster recovery with a highly favorable risk profile but has overall long-term outcomes similar to that of open techniques. Additionally, surgeons may not tolerate the learning curve of a new procedure that yields marginal perceived benefits despite significant decreases in overall complication rates, dural tears, and infections.

Takeaway: As compared to other approaches, endoscopic spine surgery tends to have:

- Less need for postoperative pain medication
- Quicker discharge and return to work
- Fewer complications
- Similar long-term outcomes and slightly better long-term visual analog scale (VAS) scores for leg pain

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Navigating the learning curve of spinal endoscopy as an established traditionally trained spine surgeon.

Nicholas A Ransom, Sohrab Gollogly, Kai-Uwe Lewandrowski, Anthony Yeung

- Learning curve study consisting of 40 patients, with 20 treated via traditional laminectomy and 20 treated via spinal endoscopy
- Mean follow-up of 38.58 months
- Pre-op VAS score of 7.95 and post-op VAS score at final follow-up of 4.01 across all patients
- Outcomes of endoscopic learning curve group improved significantly after 15 cases
- In retrospectively reviewing case log, second author noted a significant reduction in post-op narcotics use

> **Takeaway:** During the initial learning curve, spinal endoscopy produced patient outcomes equivalent to traditional techniques and may continue to improve as experience increases.

J Spine Surg. 2020;6(Suppl 1):S197-S207. doi:10.21037/jss.2019.10.03

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Complications and management of endoscopic spinal surgery.

Chang Il Ju, Seung Myung Lee

- Reviewed 103 articles related to endoscopic spinal surgery complications
- The most common complications related to endoscopic spinal surgery include dural tears, perioperative hematoma, transient dysesthesia, nerve root injury, and recurrence
- The overall incidence of clinically symptomatic complications is below 10%
  - One study reported a total complication rate of 4.7% and reoperation rate of 1.1% following cervical endoscopic surgery
  - One study reported the most common complications following thoracic endoscopic surgery were dural tear (2%) and transient paresthesia (2%). This study also reported a revision rate of 1.5%.
  - A meta-analysis of lumbar endoscopic spinal surgery cases reported that transforaminal endoscopic lumbar surgery had approximately 3 times more complications (9.1%) than interlaminar endoscopic lumbar surgery (3.4%)

Takeaway: Endoscopic spinal surgery does not yield good results for all spinal diseases, and it is important to select appropriate indications to obtain achievable surgical results. Most literature published is retrospective (level 3 evidence), and randomized controlled trials (level 1 evidence) are lacking. Higher-quality evidence is needed to further understand of the benefits and risks of an endoscopic approach to spine surgery. The overall incidence of clinically symptomatic complications with all types of endoscopic spine surgery is <10%. Most complications were minor, and life-threatening complications, such as thromboembolism, sepsis, severe bleeding, and pulmonary complications, are less frequent compared to open surgery.

Neurospine. 2023;20(1):56-77. doi:10.14245/ns.2346226.113

Initial learning curve after switching to uniportal endoscopic discectomy for lumbar disc herniations.

Catherine Olinger, Alex Coffman, Chad Campion, Kirk Thompson, Raymond Gardocki

- Median operative time decreased approximately 50% for the first 50 patients, then plateaued for both approaches (mean: 65 min)
- No difference in reoperation rate observed during the learning curve
- As the senior author increased their experience, they noted the duration of post-op narcotics use and the overall need for narcotics decreased and, ultimately, was eliminated
- No differences were observed between groups in other metrics

Takeaway: An initial learning curve was identified as 50 patients measured by decreased operative time, while reoperation rates remained similar without the need for hospital transfer or conversion to an open procedure in an ambulatory setting. Endsocopic spine surgery can be performed safely during the initial learning curve as long as the surgeon does not sacrifice safety for speed.

Eur Spine J. 2023;32(8):2694-2699. doi:10.1007/s00586-023-07583-x

The utilization of percutaneous endoscopic lumbar discectomy in recurrent lumbar disc herniation: a systematic review and meta-analysis.

Saiganesh Ravikumar, Aaron Bloschichak, Sanjeev Kumar

- Percutaneous endoscopic lumbar discectomy (PELD) is a safe, effective treatment for recurrent herniated discs, but it is unclear whether it is superior to other minimally invasive options
- 32 articles were reviewed to identify the usability of PELD in comparison to other minimally invasive options to treat recurrent lumbar disc herniations (R-LDH)
- The meta-analysis revealed the transforaminal approach to PELD is equivalent to minimally invasive transforaminal lumbar interbody fusion (MIS-TILF) in terms of ability to improve patients' functional capacity with shorter operative time, and randomized controlled trials comparing PELD to MIS-TLIF, microendoscopic decompression (MED), and open lumbar microdiscectomy (OLM) are warranted as there is insufficient evidence to state which is superior

Takeaway: This is an effective tool in the management of R-LDH based on reasonable quality and methodology.

J Spine Surg. 2025;11(1):45-64. doi:10.21037/jss-24-47